

- i. a first product equal to the product of said first real number and said second real number
  - ii. a first set of intermediate terms
- b. second real multiplication of said first real number by a third real number represented in a third finite-precision numeric format, producing a second product equal to the product of said first real number and said third real number using at least one member of the set consisting of said first product and said first set of intermediate terms

whereby said first real multiplication and said second real multiplication share computation and can have lower implementation cost than if said first product and said second product were computed separately.

10. The method of claim 9 wherein the method of said second real multiplication cannot compute the product of said first real number and said second real number, whereby the method of said second real multiplication can have lower implementation cost than if it must also be able to compute the product of said first real number and said second real number.
11. The machine of claim 9 wherein the method of said first real multiplication cannot compute the product of said first real number and said third real number, whereby the method of said first real multiplication can have lower implementation cost than if it must also be able to compute the product of said first real number and said third real number.
12. The method of claim 9 wherein the method of said second real multiplication does not use said first product, whereby said first product and said second product may be computed in a parallel manner.
13. The method of claim 9 further including addition of said first product and said second product to a first product sum, where said first product sum is not a desired product of two numbers, whereby said first product, said second

product, and said first product sum may be computed with lower cost than if each is computed separately.

14. The method of claim 9 further including first addition of said first product to a first product sum and second addition of said second product to a second product sum, where said first product sum and said second product sum are separate product sums, sums such that one or both of the following properties hold:
  - a. there is at least one sum of products to which said first product sum contributes and to which said second product sum does not contribute
  - b. there is at least one sum of products to which said second product sum contributes and to which said first product sum does not contributewhereby said method of claim 9 can be used for computing and adding the contribution of said first real number to two separate outputs of a signal processing transform.
15. A method used in computing one or more sums of products wherein at least one of said sums of products is not a desired product of two numbers, comprising multiplication to produce a first product and a second product, where:
  - a. said first product is equal to the product of a first number in a first finite-precision numeric format by a second number in a second finite-precision numeric format
  - b. said second product is equal to the product of said first number and a third number in a third finite-precision numeric format
  - c. at least one of the calculation results used in computing said first product is also used in computing said second productwhereby the method of said multiplication computes at least two products using at least one shared calculation result.
16. The method of claim 15, in which:

- a. said second product is not equal to the product of said first number and the complex conjugate of said second number except in the following cases:
  - i. said second number is equal to the complex conjugate of said third number
  - ii. said first number is zero
- b. said second product is not equal to the product of said second number and the complex conjugate of said first number except in the following cases:
  - i. said first number is real, and said second number is equal to said third number
  - ii. said first number is zero

whereby said multiplication is not a multiple-output multiplication method which computes the product of two numbers and the product of two numbers with one of the numbers conjugated.